DMT O&I Overview

26 June 2000

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Outline

- Program Overview
- System View
- Network Architecture
- DMT Portal
- DMT Event Life Cycle
- NOC/DOC
- IOC
- Collaborative Working Groups/Teams

Program Overview

Integration Concept

DMT Operations and Integration Contractor

AWACS MTC

F-15C MTC

F-16 MTC

Future Federates

F-15C MTC
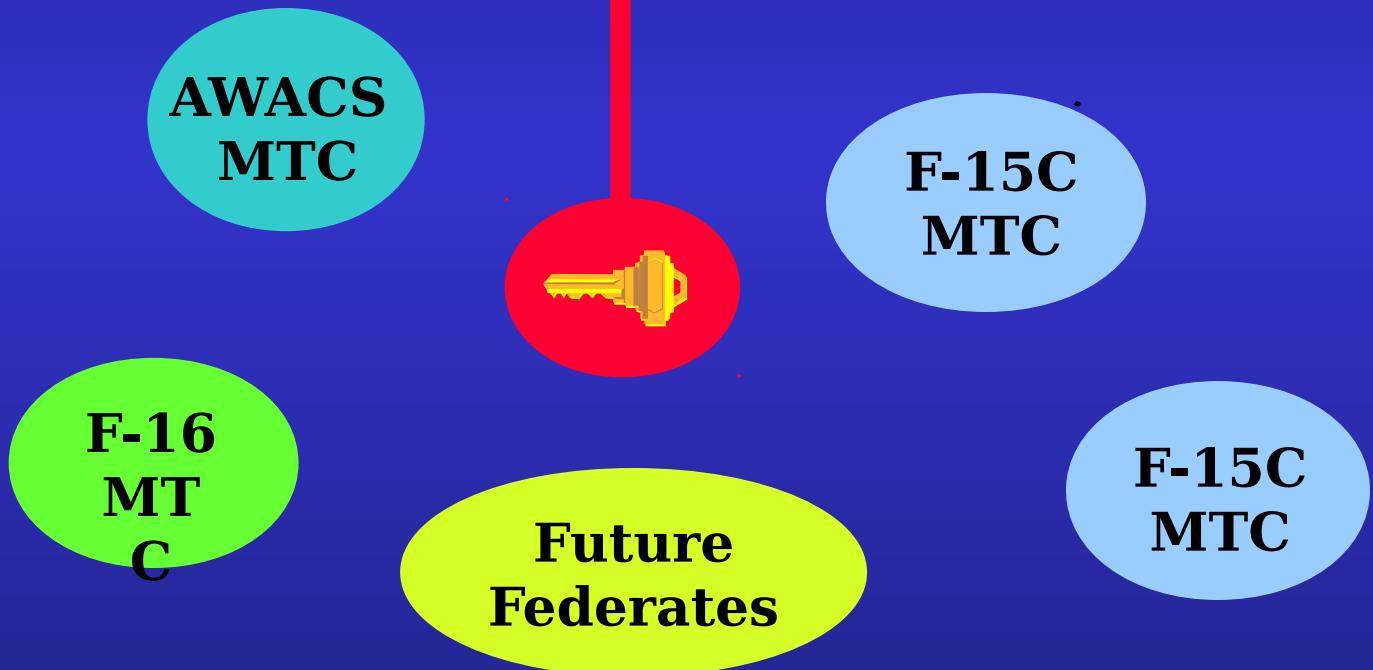
DMT Capability Evolution

FY01	FY02-FY04	FY05-06	FY07-FY10	FY10+
Initial Capability	F-16 Blk 50 JSTARS RC-135 F-15E RQ-1 F-16 Blk 40 B-1 B-2 C-5 C-17 KC-10 BOT/WST	*"Robust" Capability* F-22 F-117 JSF KC-135 C-130X C-130J	**Other Services**	**Common Synthetic Battlespace**

F-15C AWACS

Fighter Battle Management

Package and Small Composite Force

Package and Air Expeditionary Force Employment

Mission Training Capability - Air Operations Center Level

Integrated Joint Task Force Capability

Evaluate, Validate, Train, Expand Service . . .
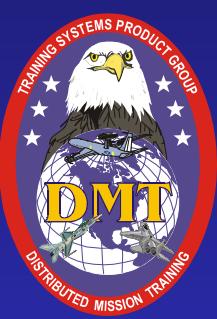
Federate Projection

PLATFORMS	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
F-15C	EGLIN LANGLEY	MT HOME	KADENA	ELMENDORF LAKENHEATH				
E-3A AWACS	TINKER 1		TINKER 2 ELMENDORF KADENA	TINKER 3	TINKER 4			
F-16 BLK 50			MT HOME SHAW NELLIS	MISAWA SPANGDAHLEM				
F-16 BLK 40					HILL NELLIS	MOODY EIELSON AVIANO OSAN		
B-1					DYESS	ELLSWORTH	MT HOME	
B-2				WHITEMAN				
E-8 JSTARS				ROBINS				
RC-135 RIVET JOINT				OFFUTT				
F-15E				SEYMOUR JOHNSON LAKENHEATH	ELMENDORF MT HOME	NELLIS		
F-22						CONUS (Note 3)		CONUS (Note 4)
F-117							HOLLOMAN	
RQ-1				NELLIS (Indian Springs)				
JSF								CONUS (Note 5)

Federate Projection

PLATFORMS	FY00	FY01	FY02	FY03	FY04	FY05	FY06	FY07
C-5					DOVER			
C-17					CHARLESTON		MCCHORD 2	CONUS (Note 6)
					MCCHORD 1			
KC-10 BOT					TRAVIS			
					MCGUIRE			
KC-10 WST					TRAVIS			
					MCGUIRE			
KC-135 OFT							FAIRCHILD	
							MCCONNELL	
							GRAND FORKS	
							MACDILL	
							ROBINS	
C-130X								MCCHORD
C-130J							CONUS (Note 7)	

SCOPE: The contractor shall be the primary agent providing integration services to accomplish inter-team, and intra-team training objectives for the federate systems identified in the DMT Federate System Projection. The DMT System shall evolve to support participation of additional federate systems, to include command, control, communications, computer, intelligence, surveillance, and reconnaissance (C4ISR), in DMT events.

DMT Integration Plan

DMT STANDARDS	DMT STANDARDS	DMT STANDARDS	DMT STANDARDS	DMT STANDARDS

O&I SERVICES

▲ **17 Apr 00**

★ **IOC**
12 Jan 01

F-15C MTC PROGRAM

E-3 MTC PROGRAM

▲ **Nov 00**

F-16 MTC PROGRAM

▲ **Apr 02**

Jan 01   **Jan 02**   **Jan 03**

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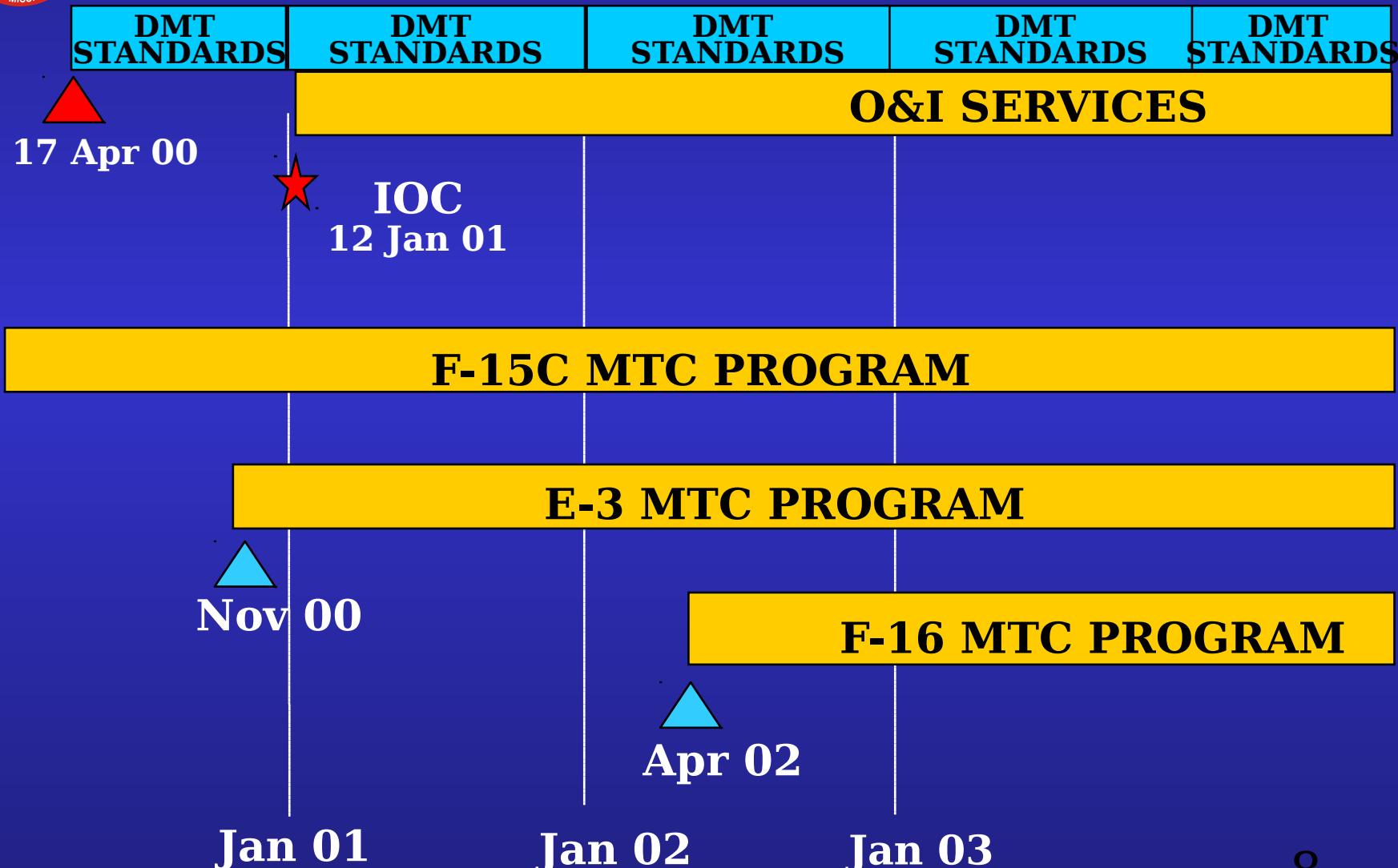
Acquisition Strategy

- **Fixed Price through CY 04**
- **Award term potential 05 to 15**
- **Definitization of NTE on an annual basis**

| 00 | 01 | 02 | 03 | 04 | ... | +1 | ...15 |

Calendar Year

| FFP | NTE |
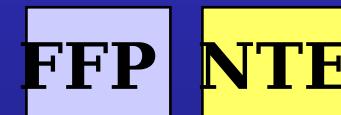
Integration Services

Services

- DMT System Evolution
  - Provide an integrated roadmap of new capabilities to meet DMT training objectives and perform R&D tasks as required

CLINs

- CLIN 0002 System Capability Upgrade Roadmap (T&M/LH/FFP)

- CLIN 0003 R&D (CPFF/FFP)

Integration services for up to 15 years
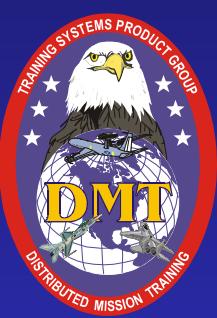
Integration Services (cont'd)

Services

CLINs

- DMT System Standards
  - Establish and maintain DMT system standards to provide interoperability among federates

- Federation Management
  - Provide services to implement, evaluate, archive, and maintain DMT federations, the RTI and FOMs. The contractor shall insure federations adhere to DMT standards

- CLIN 0005 System Standards (T&M/LH/FFP)

- CLIN 0006 Federation Management (FFP)

Operation Services

Services CLINs

- DMT System Management
  - Network services provider: responsible for network connectivity to and from each federate MPOP
  - Identify system limitations in supporting training events
  - Scheduling
  - Maintain network availability
  - Federate site support
  - Provide Federate to DMT system connectivity as directed

- CLIN 0007 DMT System Management (FFP)

- CLIN 0009 Federate System Site Support (T&M/LH/FFP)
- CLIN 0013 Connectivity Services: Federate to DMT System (FFP)

Operation Services (cont'd)

Services

- Planning and Support
  - Support for Government-designated events

- DMT Proposal Evaluation Support
  - Support source selections for future DMT federate system services

CLINs

- CLIN 0008 Planning and Support (T&M/LH/FFP)

- CLIN 0010 DMT Proposal Evaluation Support (T&M/LH/FFP)

Operation Services (cont'd)

Services

CLINs

- DMT O&I System Security & Protection

  – Support Federations with multiple levels of classifications among federates

  – Support Security Accreditation and Certification

- CLIN 0011 DMT System Security (NSP)

- CLIN 0012 Acquisition Systems Protection (NSP)

Network operation services for up to 15 year

Major CLINs

- CLIN 0006 Federation Management
  - Order annually on 2 Jan
  - Priced for entire effort -- not on a platform basis
- CLIN 0007 System Management
  - Order annually on 2 Jan
  - Priced for each federate system/site
  - Price covers up to base hours
    - 150 hours for all AMC sites; AWACS-Kadena, Elmendorf; B-1 Mt Home
    - 300 hours for B-2 and F-117
    - 600 hours for remaining sites
- CLIN 0005 System Standards
  - Expect to negotiate and order annually on 2 Jan

Program ROEs

- Only Government representative authorized to direct contract changes is the Contracting Officer

- Integrated Product Team (IPT) Environment

- Execute the program in accordance with the contract
  - Contract captures the IPT's agreements and performance requirements
  - IPT concept demands that all members know the contractual requirements

- Contract is the baseline and foundation for the entire program

- As people move on, contract survives as the commitments between the government and contractor

> Bottomline: TRW will provide
> "training services" IAW the contract

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Users' Expectations

- Reliability of training is essential
- In this environment, reliable performance is mandatory
  - Simpler, with known limitations better than
  - Complex, more capable that does not perform consistently

- New capability for users
  - Training objectives will evolve over time with experience and exposure to distributed training
  - Very interested in usability and flexibility in some areas (e.g., debriefings and scheduling)

System View

Security Architecture

Access-Controlled Public Telecommunications Infrastructure

Unclassified (but Secure)

Federate System
Unclassified
Classified

NOC
Unclassified

DOC
Unclassified
DMT Scheduling System
Web Server
Classified
Repository

Federate System
Unclassified
Classified

Crypto Device

Crypto Device

Crypto Device

Router
Router
Unclassified (but Secure)

Router

Private DMT ATM Network

Router

DMT-2-10-1110

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C&A Process
5024

1 Determine Security Mode of Operation

23 Identify Need for Recertification/ Reaccreditation

2 Develop System Description

3 Develop Protection Criteria

Phase IV:
Post- Accreditation

22 Review & Update SSAA

Phase I:
Pre-Certification

Initial Starting Point

4 Develop System Security Policy

21 Review System/Environment Modification Requests

20 Review/Assess System/ Environment

5 Perform Threat/ Vuln Assessment

6 Determine Certification Level (CL)

19 Review New Threats and Vulnerabilities

CERTIFICATION AND ACCREDITATION APPROACH

7 Develop the C&A Plan

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8 Develop System Security Architecture

17 Make Accreditation Decision

9 Develop Trusted Facility Manual

Phase III:
Accreditation

16 Review SSAA

10 Develop Security Features Users Guide

15 Present Findings/ Make Accred Recommendation

11 Perform ST&E

14 Prepare SSAA

13 Develop Accreditation Recommendation

12 Perform Risk Analysis

Phase II:
Certification

Wide Area Network Implementation

- TRW has selected Qwest Communications as the wide area network provider for the CONUS DMT WAN

- Global Crossing has been selected to provide OCONUS circuits

Qwest®   Global Crossing

Network carriers treated as commodity and will be managed by TRW

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Network Architecture

Network Architecture

DMT Global Network

Qwest CONUS WAN

Global Crossing OCONUS WAN

Co-located
Switch

2-5 T1 SVC

2-T1s PVC

2-5 T1s PVC

T1 PVC

CONUS
Federate
System

DMT
NOC

DMT
DOC

OCONUS
Federate
System
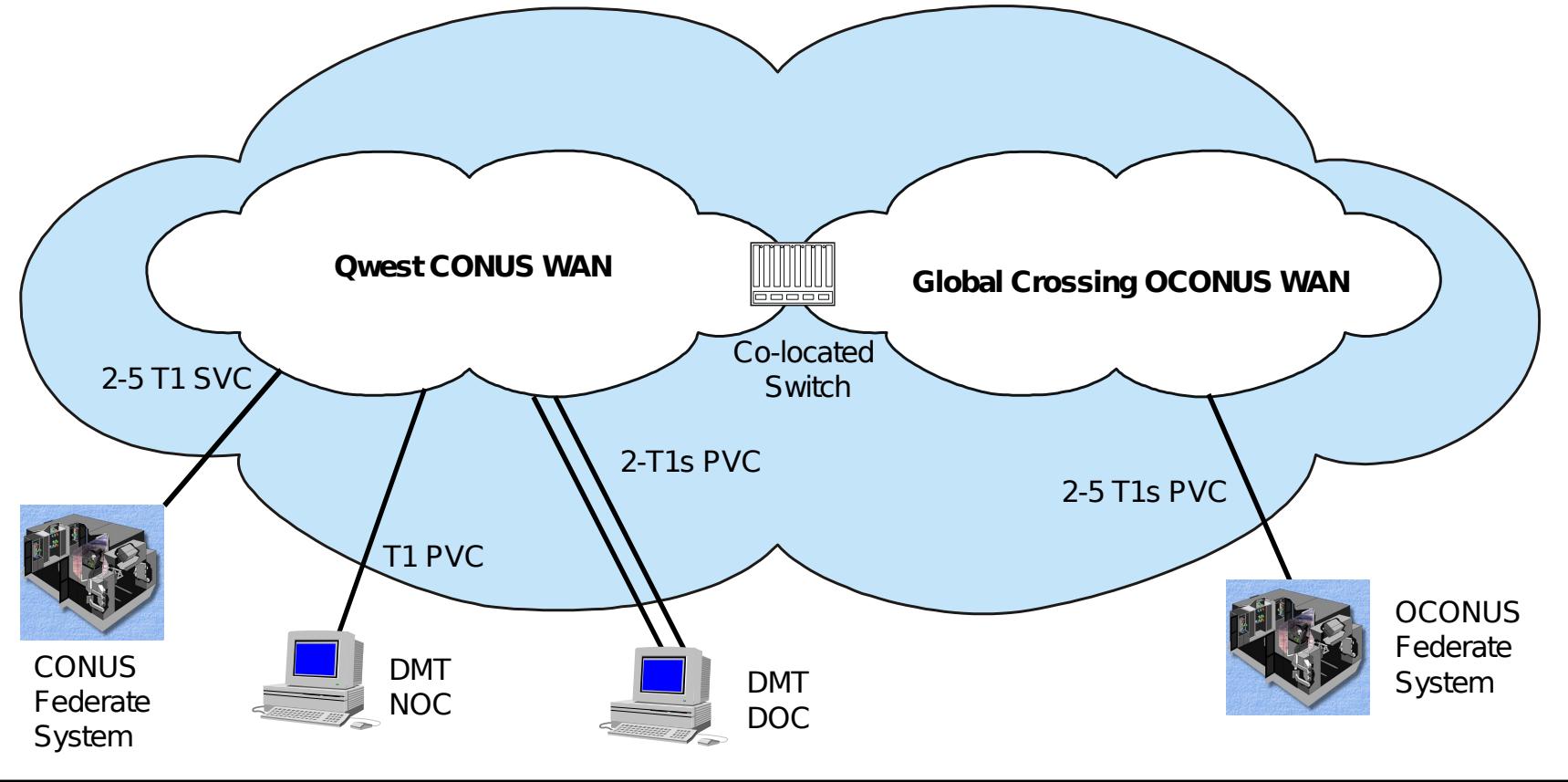
DMT-2-10-1118

T1 Allocation per Site

- Premise: Each Federate System requires different bandwidth due to different missions
- Federate Systems divided into 4 categories/ or classes
- T1 allocation per site is Federate System dependent

5-T1s

3-T1s

4-T1s

2-T1s

Fast Flyers			AWACS-like	
F-15C	F-16 (40)		E-3	EC-130 (ABCCC)
F-15E	F-22		E-8	RC-135
F-16 (50)			EC-130CC	
Bombers, Transports, Attack Aircraft			Tankers	
F-117	C-5		KC-10 BOT	
B-1	C-17		KC-10 WST	
B-2	C-130		KC-135 OFT	
B-52				

DMT Portal

Interoperability Architecture

F-15 MTC

| RTI Component | RTI Component | RTI Component | RTI Component | RTI Component |

LOCAL AREA NETWORK (LAN)
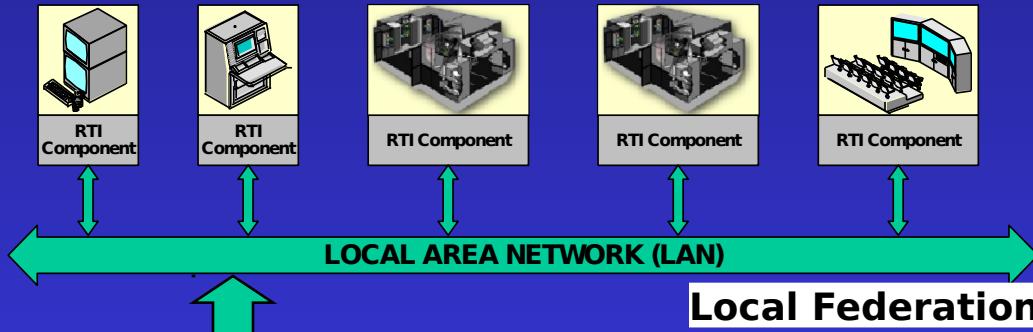
Local Federation

Hierarchical design: Local Federate System appears as a single Federate in DMT Federation

Local RTI Component

"DMT" RTI Component

Portal

F-16 MTC

| RTI Component | RTI Component | RTI Component | RTI Component | RTI Component |

LOCAL AREA NETWORK (LAN)

Local RTI Component

"DMT" RTI Component

E-3A MTC

| RTI Component | RTI Component | RTI Component | RTI Component | RTI Component |

LOCAL AREA NETWORK (LAN)

Local RTI Component

"DMT" RTI Component
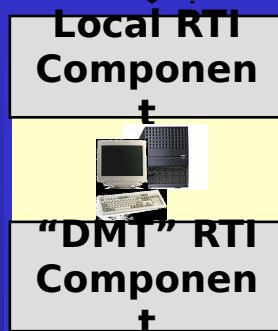
WIDE AREA NETWORK (WAN)

DMT Federation

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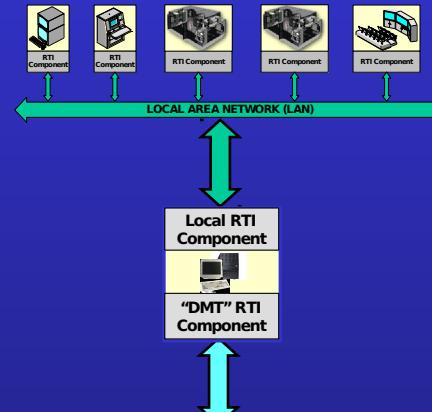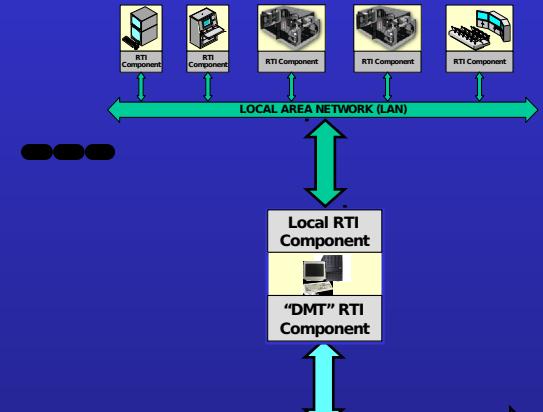
Portal Benefits

- Portal open systems approach minimizes Federate System integration costs and maximizes Federate System design flexibility by modularizing the design
    - Allows independent federate system HLA/RTI implementation schedules
    - Allows independent DMT O&I contractor RTI/WAN optimization
    - Insulates federate systems from external changes
    - Insulates DMT system from internal federate system changes
- Portal reduces the need for consensus in some areas
- Initial Support for Federate Systems:
    - DMSO RTI 1.3vx to DMT RTI
    - DMSO RTI 1.3 NG to DMT RTI
    - DIS IEEE 1278.x to DMT RTI
        - Start with STRICOM-developed DIS/HLA Gateway

DMT RTI

- Portal interfaces Federate System RTIs with an O&I-specified RTI -- DMT RTI
- Federate Systems can use the RTI of their choice
- Internal FOMs don't have to update with evolution of DMT Federation FOMs
- DMT RTI can be customized for long-haul efficiency if needed to meet performance targets
- Start with existing DMSO-approved RTI and refine/specialize as necessary to meet DMT WAN demands

Local RTI Component

"DMT" RTI Component

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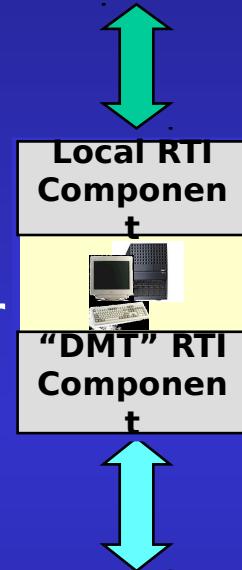
DMT Event Life Cycle

DMT Event Development Architecture

DMT FEDEP $\longrightarrow$ Training Federations

DMT Event Planning

Scenario Specification

DMT Event Construction

Ready-to-schedule

Ready-to-modify

Ready-to-execute

DMT Event Scheduling

Need Mods $\longrightarrow$ DMT Event Reconstruction

Ready-to-execute

Ready-to-execute

DMT Event Execution
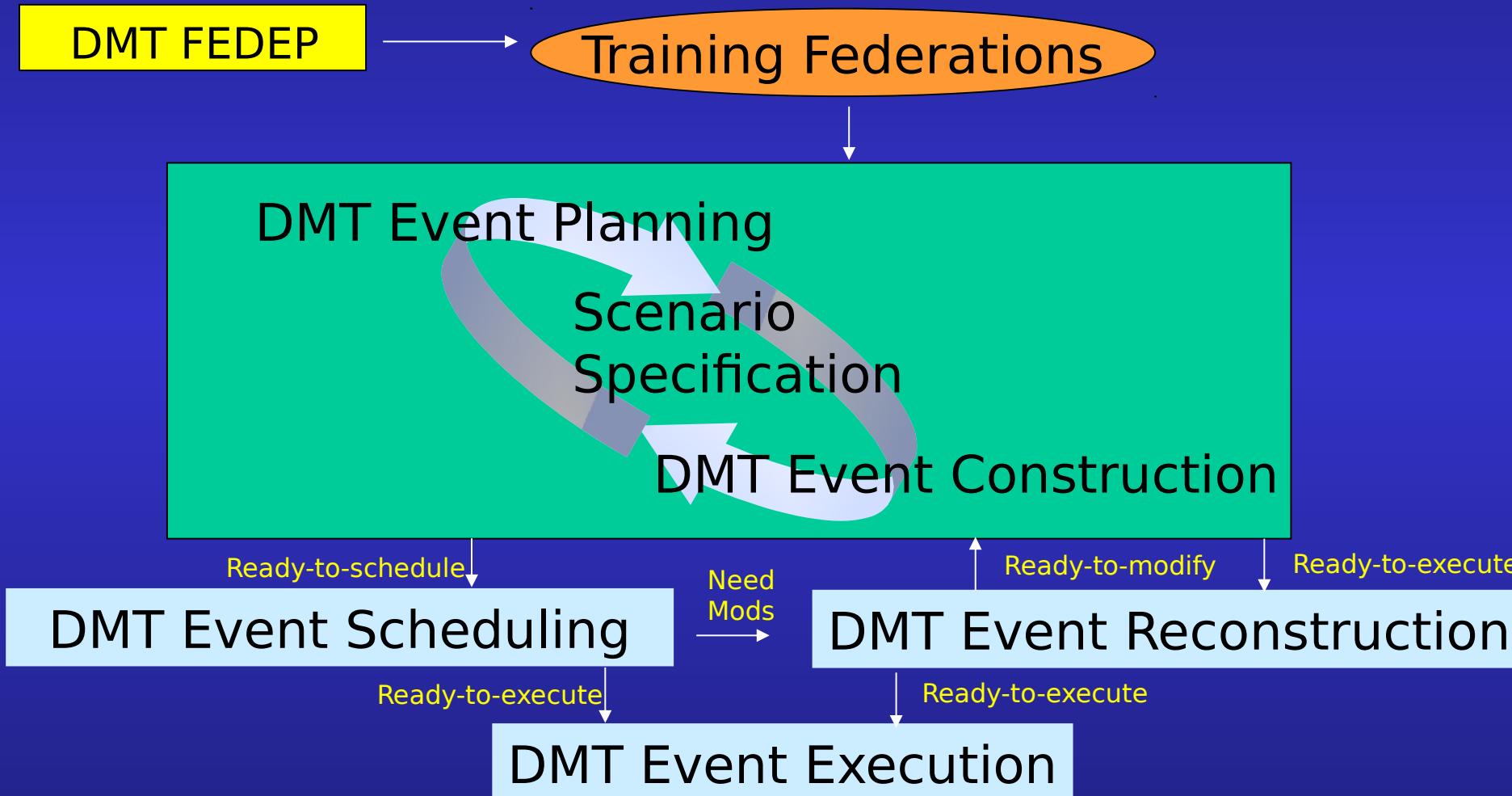
DMT Tailored FEDEP
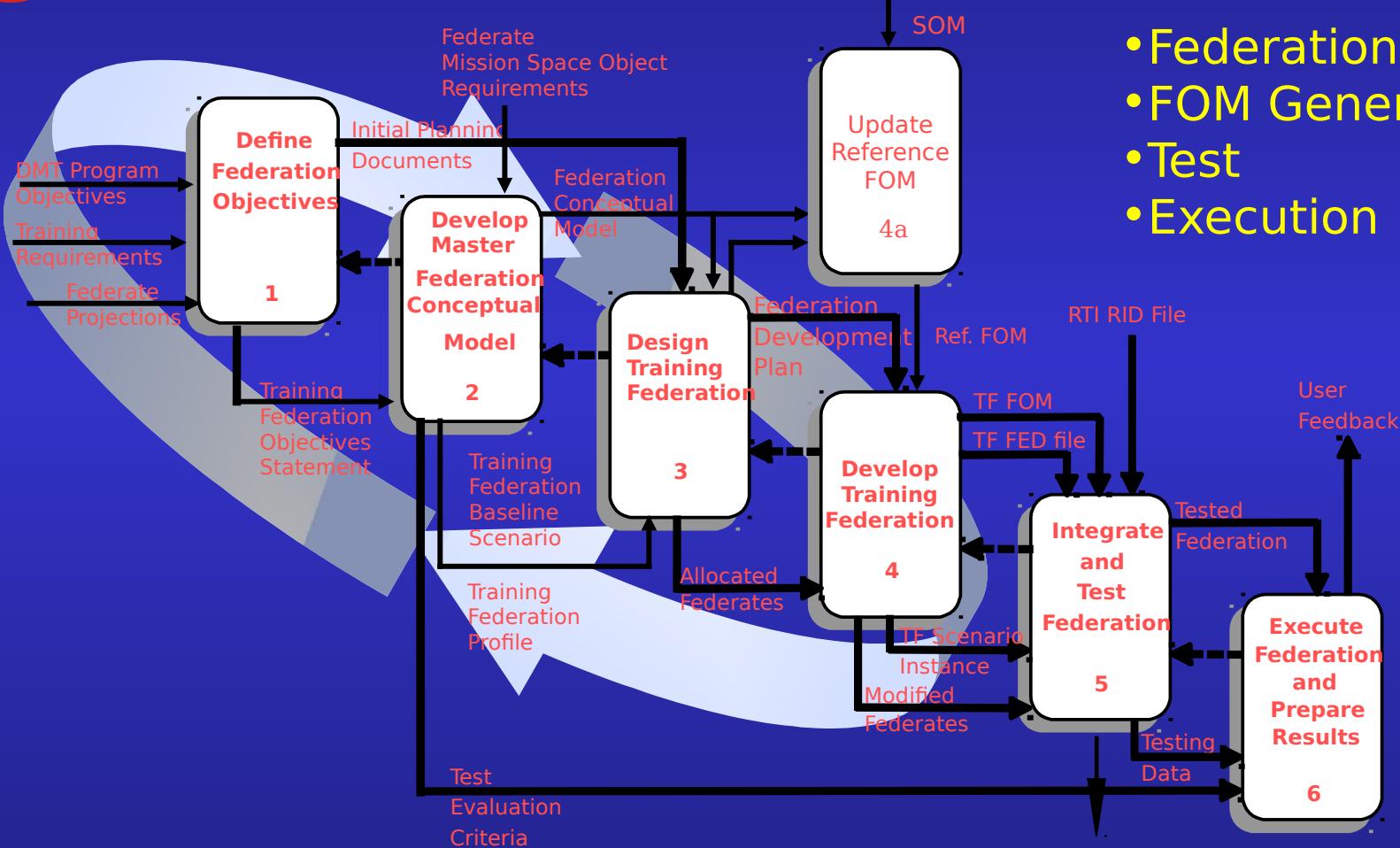
- Federation Definiti
- FOM Generation
- Test
- Execution

Define Federation Objectives — 1

Develop Master Federation Conceptual Model — 2

Design Training Federation — 3

Update Reference FOM — 4a

Develop Training Federation — 4

Integrate and Test Federation — 5

Execute Federation and Prepare Results — 6

SOM

DMT Program Objectives
Training Requirements
Federate Projections

Initial Planning Documents

Federate Mission Space Object Requirements

Federation Conceptual Model

Federation Development Plan

Ref. FOM

RTI RID File

Training Federation Objectives Statement

Training Federation Baseline Scenario

Training Federation Profile

Allocated Federates

TF FOM

TF FED file

TF Scenario Instance

Modified Federates

Tested Federation

User Feedback

Testing Data

Test Evaluation Criteria

FOM Generation

- Based on evolving Reference FOM developed to cover DMT universe
- Training Federations (TF) are defined to meet specific training objectives and scenario ranges
- TF FOMs derived as subsets of Reference FOM
- *TFs and their FOMs form basis of delivering usable training capability*

FOM/RTI IPT

Training Requirements

O&I Tools ==> Documentation

- **Master Conceptual Model**
- **Reference FOM**

- **Training Federation FOM**
- **Baseline Scenario**
- **Baseline FEPWB**

- **DMT Event FOMs**
- **DMT Event Scenarios**
- **Event FEPWBs**
- **FED and RID Files**
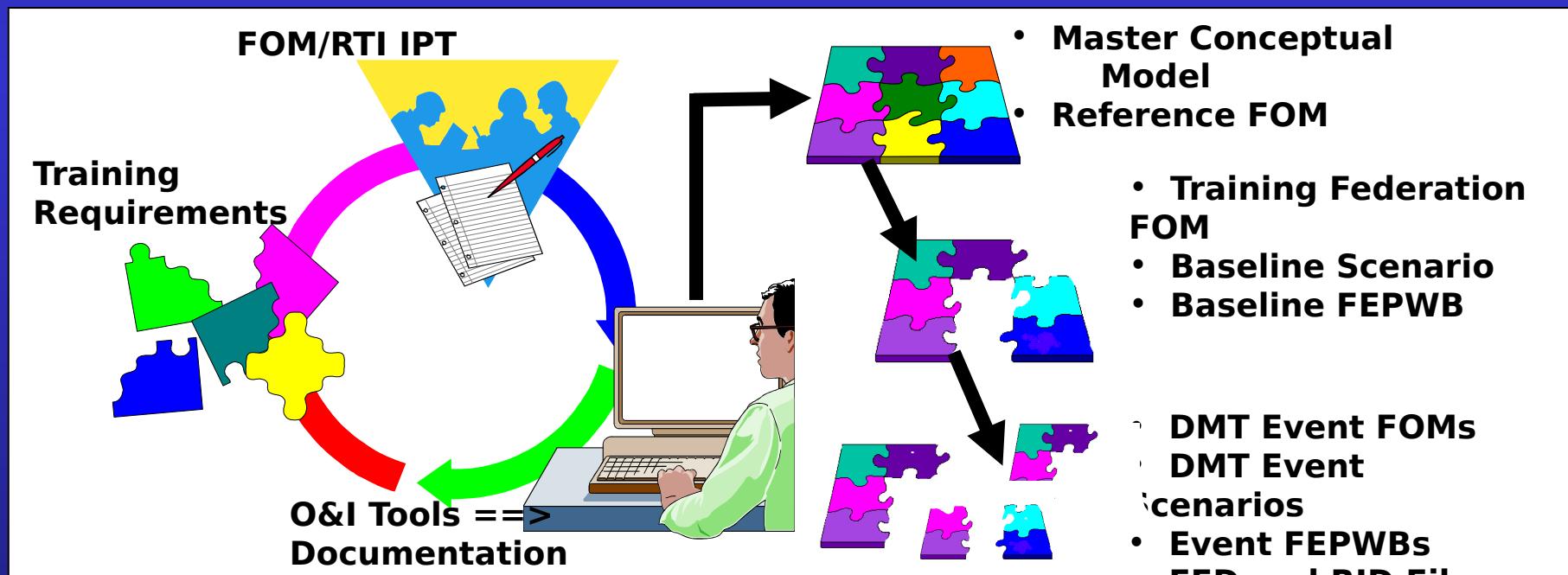
DMT Event Life Cycle Summary

- DMT Events arise from Training Needs
- DMT Events are conceived and constructed on a cycle involving
  - Air Force and Federate System as Conceivers, Implementers
  - O&I as Verifier, Coordinator, Formalizer
- DMT Events are Scheduled & Executed
  - Air Force determines time, duration, content
  - Federate Systems provide execution resources
  - O&I provides networking, tools and standards to allow coordinated initiation, execution, completion
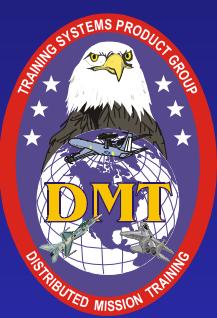
Network Operations Center (NOC) / DMT Operations Center (DOC)

Roles & Responsibilities

- Network Operations Center (NOC)
  - Maintains real time connectivity among federate system sites
  - Provides monitoring, control, and support to identify and resolve network issues
  - Collects data sufficient for post event analysis and coordinating event playback
  - Measures network services availability
  - Provides customer support

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Roles & Responsibilities

- DMT Operations Center (DOC)
  - Coordinates DMT event start-up and termination
  - Maintains DMT System Security
  - Resolves operational issues
  - Provides customer support
- Help Desk
  - Address administrative questions
  - Route federate system questions as appropriate

Scheduling

- O&I network services can be made available at any time
- O&I monitors network usage
- Customer is not hindered by network scheduling requirements
- Scheduling software resides at the NOC
  - NOC has visibility into all DMT Events
  - NOC coordinates internally with the DOC to monitor and augment support

IOC

IOC Definition

Point at which active federate systems per the Federate System Projection, Attachment 1 to SOW, have the capability to train in a real-time distributed synthetic environment

IOC scheduled for 12 Jan 2001
- F-15C @ Eglin
- F-15C @ Langley
- AWACS @ Tinker1

O&I Distributed Training Services Available

Collaborative Working Groups/Teams

DMT Management Structure

PM Team

- TSPG
- **DMT O&I Program Manager** Dr. M. Papay (TRW)
- TASC
- CAE
- SPARTA
- MATCOM
- L3 Comm

Associate Contractor Agreements

System Integration Engineering Team (SIET)

DMT O&I Chief Architect & Deputy PM Bruce McGregor (TRW)

Membership
Lead Functionals Plus IPT Leads
- Chief Engineer
- Quality Assurance
- System Test
- Security
- Standards Development WG

Training Effectiveness Advocate (TRW)

FOM/RTI IPT T. McDermott (TASC)

Repository IPT T. Valle (Sparta)

Network IPT D. Holoman (TRW)

Operations IPT TRW

* ACA Signed

- Boeing F-15 *
- F-16 *
- E-3A *
- •
- •
- •

Federates

Standards Development Working Group

Full SIET/IPT structure for Phase II.

Team IPT Responsibility & Accountability

SIET

Responsibility:

- System Integration
- Communication between IPTs
- System Test
- Allocate DMT O&I Requirements
- Develop Architecture
- Establish and manage interfaces

- Establish Federations
- Insure interoperability
- Establish standards
- Tailor existing TRW processes
- Mitigate and control technical risks
- Technology insertion

Accountability:

- Federate I/F standards
- Architecture description document
- Federate performance standards
- System performance document

- Federation Training Objectives Specification
- Federation security requirements
- System Capability Upgrade Roadmap
- Program Protection Document

Network IPT

Responsibility:

- Establish site readiness
- Link trainer and sensor simulators

- Implement and maintain network standards
- Assess compliance with network standards
- Implement and operate network

Accountability:

- Network hardware and software
- Federate connectivity specification

- Standard compliance plan
- Site description document

Repository IPT

Responsibility:

- Design, develop and maintain data repository

- Collect data, models and documentation
- Provide access and retrieval system

Accountability:

- Data repository operation

- DMT architecture index

FOM/RTI IPT

Responsibility:

- Develop and implement Federation Object Models

- Develop and implement run-time infrastructure

Accountability:

- FOM Software
- RTI Software

- DMT FOM Specification
- Federation specific FOM specification

Operations IPT

Responsibility:

- Establish and maintain CONOPs
- Train users

- Exercise schedule planning
- Report to training events
- Schedule network

Accountability:

- CONOPs

- DMT scheduling procedures
- Post training event report

Government and Federate Systems Providers are invited to be an integral part of the Integrated Product Teams.
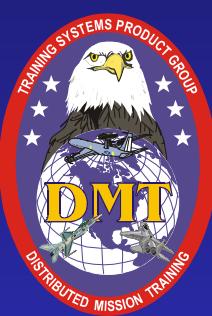
Standards

- Collaborative process based on current industry approach
  - Using O&I web site
  - Position papers
  - Stakeholders involved in IPTs, Standards Development Working Groups, and SIET
- Identified required standards and implementation timeline
- Based on JTA/HLA standards
 - DIS at IOC
  - HLA at 1st Federation

Standards Stakeholder Participation

- Established a Standards Development Working Group (SDWG) to oversee and coordinate the development and maintenance of DMT system interoperability standards.

- SDWG provides a forum for all stakeholders to discuss, review, and approve standards.

- SDWG promotes the rapid formation and adoption of DMT interoperability standards necessary to achieve effective training.

Standards Development Process
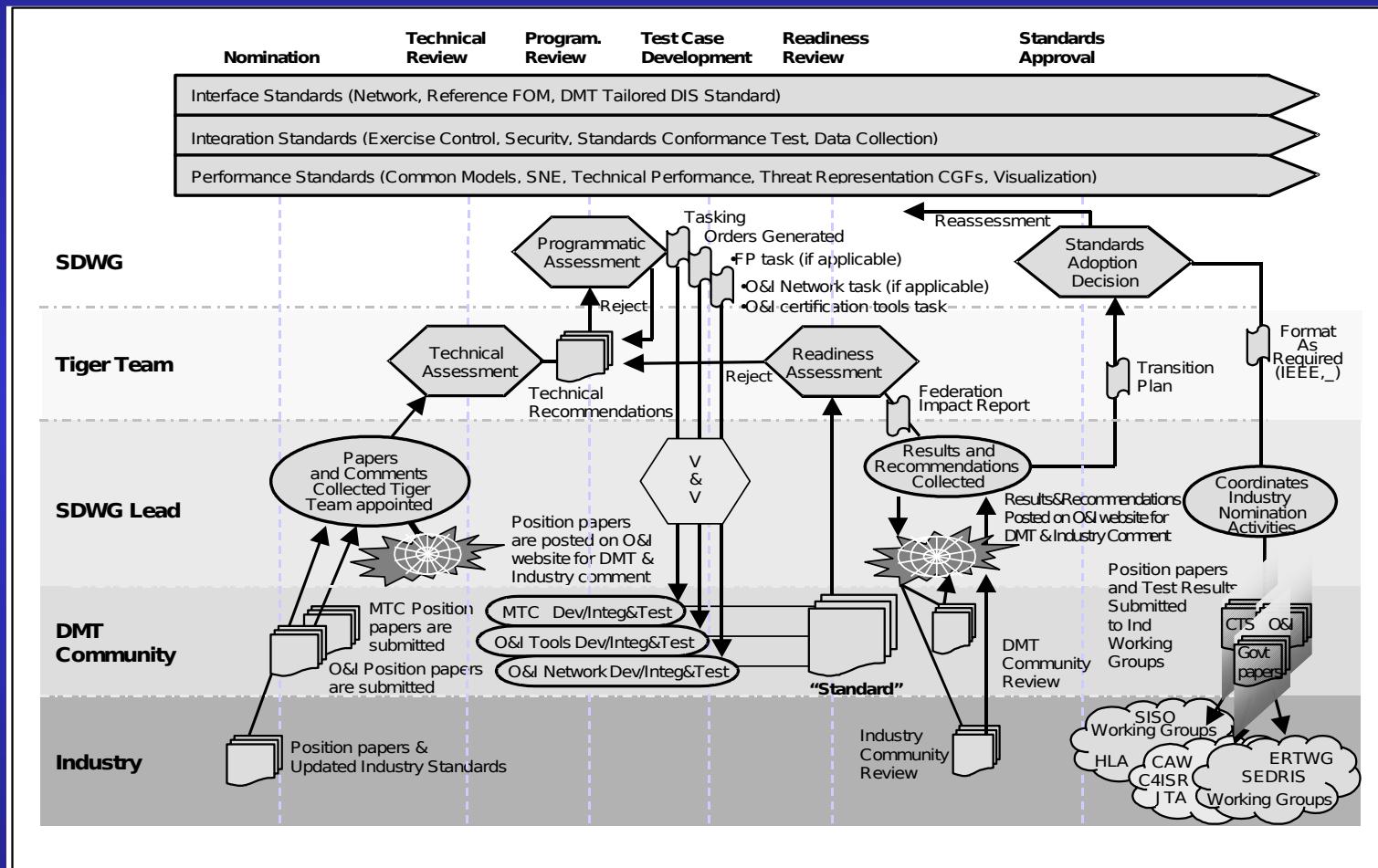
Standards Implementation

Standards Category	Standard	Initial Operational Capability	First Federation	Objective System
Interface Standards	Network	X	X	X
	DMT Tailored DIS Standard	X		
	Standard Portal Interface Specification	X	X	X
	Reference Federation Objective Model (FOM)		X	X
Integration Process Standards	Event Control	X	X	X
	Security	X	X	X
	Standards Conformance Testing	X	X	X
	Data Collection		X	X
Federate System Performance Standards	Technical Performance	X	X	X
	Synthetic Natural Environment (SNE)		X	X
	Threat Representation and Computer Generated Forces (CGF)		X	X
	Common Models			X
	Visualization			X

Web Site

- Key in communicating with DMT community
- http://www.trwdmt.com
- Both public and restricted site
- Can apply for access via website
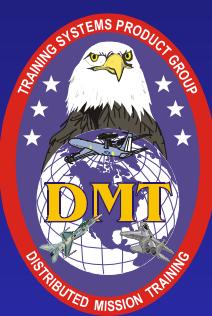
Summary

- O&I is up and running
- Distributed training capability will evolve
  - Brief/Debrief
  - Scheduling, etc.
- Success dependent on collaborative processes with MTC contractors
- Potential DMT Issues
  - Security C&A Process
  - MTC's current capability
  - Users' level of involvement